Remarks

Claims 1-18 remain in this application and are presented for the Examiner's review and consideration. Claims 1, 8, and 10 have been amended and claim 18 has been added. Applicant believes the claim amendments, additions, and remarks herein serve to clarify the present invention and are independent of patentability. No new matter has been added.

35 U.S.C. §101 Rejection

Claims 8, 9, 14, and 15 were rejected under 35 U.S.C. 101 as directed to non-statutory subject matter. Accordingly, Applicant has amended claim 8 as suggested by the Examiner. In light of the foregoing, Applicant requests reconsideration and withdrawal of the Section 101 rejections.

35 U.S.C. §103 Rejection

Claims 1-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2005/0228250 to Bitter ("Bitter"). In response, Applicant respectfully submits that this rejection should be withdrawn.

Bitter relates to a 3D visualization (V3D) system and method for assisting in medical diagnosis and evaluation of internal organs by enabling visualization and navigation of complex 2D or 3D data models of internal organs, and other components, which models are generated from 2D image datasets produced by a medical imaging acquisition device (e.g., CT, MRI, etc.). (¶[0003]).

The 3D imaging application (18) comprises a 3D imaging tool (20) referred to herein as the "V3D Explorer" and a library (21) comprising a plurality of functions that are used by the tool. (¶[0034]). The V3D Explorer (20) is a heterogeneous image-processing tool that is used for viewing selected anatomical organs to evaluate internal abnormalities. (Id). The UI provides access points to menus, buttons, slider bars, checkboxes, views of the electronic model and 2D patient slices of the patient study. (Id). As explained in more detail below, the V3D Explorer (20) can be used to interpret any DICOM formatted data. (¶[0040]).

The V3D Explorer allows a user to: (i) set specific volume rendering parameters; (ii) perform 2D measurements of linear distances and volumes, including statistics (such as standard deviation) associated with the measurements; (iii) provide an accurate assessment of abnormalities; (iv) show correlations in the 2D slice positions; and (v) localize related information in 2D and 3D images quickly and efficiently. (¶[0044]). The V3D Explorer displays 2D orthogonal images of individual patient slices that are scrollable with the mouse wheel, and automatically tags (colorizes) voxels within a user-defined intensity range for identification. (¶[0045]).

As such, Bitter discloses the display of 2D orthogonal images as "slices," which are usually delivered in DICOM images. The slice can be scrolled through with a mouse, wherein voxels within a user-defined intension ranges are automatically tagged for identification. The tagged voxels necessary lie within the plane of the orthogonal slice.

In contrast, the present invention relates to the field of volume visualization, and more particularly without limitations to volume rendering. (¶[0001]). The present invention provides a method of volume visualization to visualize an image region having a defined distance for a reference surface comprised in the image data. (¶[0013]). A user can interactively specify a desired distance from the reference surface. (¶[0014]). In response the voxels of the volumetric data having the specified distance from the reference surface are selected and visualized. (Id). This enables the radiologist to view surfaces in the volumetric data related to a selected reference surface. (¶[0015]).

The present invention enables to visualize these images in an intuitive and easy to interpret way. (¶[0019]). This is due to the fact that the patient's anatomy is used as a reference for defining the image regions to be visualized. (Id.) Thus the invention enables to produce images which show almost homogenous natural curved layers of the body wherein a pathology is easily noticed. (Id.)

Figure 2 shows a two dimensional slice 200 of a volumetric data set. (¶[0046]). Within slice 200 there are voxels 202, 204, 206, 208, 210... which belong to an image region which has been segmented from the volumetric data. (Id.) These voxels 202 to 210 define the reference surface of the volume visualization. (Id.)

As a pre-processing step before the volume visualization the distance of all voxels V_i, V_j outside the segment reference surface to the segment references surface are determined. (¶[0047]). Next a user can select a desired distance and those voxels of the volumetric data set which have a distance from the reference surface corresponding to the user selected distance are shown in the visualization. (¶[0051]).

As such, the second voxels will belong to various orthogonal slices for a curved reference surface as in the case for an organ. For example, for an organ having a curved references surface, the user selected image will produce a 2D image comprised of voxels which do not belong to the same orthogonal slice. Bitter only discloses the displaying of 2D orthogonal images as "slices, making no reference to a determination of second voxels where the second voxels are spaced the user selected distance from the references surface, nor the viewing of the second voxels in a 2-dimesional image, where the 2-dimensional image is located the user selected distance from the references surface.

Claim 1 recites, *inter alia,* a method of volume visualization. The method includes providing of volumetric data, where the volumetric data includes a plurality of voxels defining a body structure and first voxels belonging to a reference surface, the reference surface being a surface of a body structure; entering a user selected distance by means of user interface means comprising a wheel mouse, an amount of rotation of the wheel of the wheel mouse being indicative of the user selected distance, the user selected distance measured from the surface of the body structure; determining of second voxels from the plurality of voxels of the volumetric data, wherein the second voxels are spaced the user selected distance from the reference surface, the second voxels belonging to the body structure; and visualizing of the second voxels in a 2-dimensional image, wherein the 2-dimensional image is located at the user selected distance from the surface of the body structure. Claims 8 and 10 include similar elements.

Accordingly, Applicant respectfully submits that amended independent claims 1, 8, and 10 are patentable over Bitter. Based on at least their dependencies, Applicant submits that the dependent claims are patentable as well at least for the same reasons.

New Claim

Applicant has added claim 18, which depends from claim 1. Support for claim 18 can be found, for example, in paragraphs [00052] and [00054]. Applicant submits that claim 18 is patentable over the cited prior art at least for the same reasons as claim 1.

Conclusion

In light of the foregoing, this application is now in condition for allowance and early passage of this case to issue is respectfully requested. If any questions remain regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

No fee is believed due. However, please charge any additional fees (or credit any overpayments of fees) to the Deposit Account of the undersigned, Account No. 500601 (Docket No. 7390-X04-030).

Respectfully submitted,

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